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ABSTRACT

The types of assessment methods that 400 Jamaican primary teachers indicated that they used in teaching science were analyzed using three instruments. Most of the teachers indicated that they often used oral quiz and other traditional assessment methods (TAM) while alternative assessment methods (AAM) were rarely used. An oral quiz was often used by most of the 30 teachers whose 150 lessons were actually observed. More females claimed that they used oral quiz more than males. Rural teachers indicated that they used more TAM than their urban peers while older and more experienced teachers used more AAM than their younger and less experienced peers respectively. Trained teachers indicated that they use more of both TAM and AAM than untrained teachers. Significant differences existed in the number of those who used written tests in favor of teachers aged over 30 years and the less experienced ones; practical work, oral quiz, and projects in favor of those over 30; and portfolio in favor of those aged over 30 and urban teachers. (NB)

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An Analysis of Jamaican Primary School Teachers' Science Teaching Assessment Strategies

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Abstract

By using three instruments, the types of assessment methods that 400 Jamaican primary teachers indicated that they used in teaching science were analyzed. Results showed that most of them indicated that they often used oral quiz and other traditional assessment methods (TAM), while alternative assessment methods (AAM) were rarely used; oral quiz was often used by most of the 30 teachers whose 150 lessons were actually observed; more females claimed that they used oral quiz more than males; rural teachers indicated that they used more TAM than their urban peers, while the older and more experienced teachers indicated that they used more AAM than their younger and less experienced peers respectively; trained teachers indicated that they used more of both TAM and AAM than untrained teachers; significant differences existed in the number of those who used (a) written tests in favor of teachers aged over 30 years and the less experienced ones; (b) practical work, oral quiz and projects, in favor of those over 30, and (c) portfolio, in favor of those aged over 30 and urban teachers.

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Introduction

Lehman (1994, p. 16) defines "assessment" as a process of collecting, interpreting and communicating information about students' progress on the learning outcomes set by the governing bodies. Foster and Hesting (1994) opine that assessment and instruction are mirror images of each other and that while assessment guides instruction, instruction guides assessment. The literature shows that the use of paper-and-pencil tests for all purposes are the commonest assessment modes used worldwide (Jones, 1994; Tolman & Baird, 1995). The growing concern over the demerits of traditional assessment methods (TAM), in which testing predominates (Orstein, 1994), has resulted in the call for and use of various "alternative assessment" methods (AAM) in various school subjects. Those used in science teaching and learning include: performance-based assessment, science journal writing, portfolios, diaries, projects, learning logs, creative drama, observations and student's self-assessment (Jones, 1994; Worthen, 1993). Two of the rationales for the use of AAM in science education are that they can be utilized (a) singly or in combination with other assessment methods to evaluate different aspects of students' performance such as students' conceptual development and problem-solving abilities (Jones, 1994); and (b) to determine how well the current objectives of a curriculum are being met (Ornstein, 1994).

The current Jamaican primary school curricula introduced in 1980 are presently being revised. In response to contemporary trend to move away from the TAM to the use of the AAM, it is expected that AAM will feature prominently in the revised curricula on all school subjects including science. Hence, it was considered pertinent to investigate the types of assessment strategies Jamaican primary school teachers claimed they employed compared with those they actually utilized in

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assessing their students' science learning. This is because the literature indicates that (a) TAM are commonly used worldwide (e.g. Jones, 1994); (b) many teachers encounter difficulties in using AAM (e g. Maeroff, 1991), and that these originate mainly from their defective teacher-education (e.g. Stiggins, Miller & Reed, 1992); (c) teachers' assessment methods influence students' learning and school achievement (e.g Wiggins, 1993); and (d) we are not aware of any published studies on the assessment strategies used by Jamaican or other primary school teachers in any other Anglophone-Caribbean nations in their teaching of science. Moreover, there is a paucity of published research on the links among teachers' gender, school location, age, qualification, and teaching experience and their science assessment methods. We conjectured that there are likely to be some differences in the assessment methods used by Jamaican primary school teachers in their science teaching linked with these variables. This conjecture was put to the test in this study.

Purpose of the Study

This study sought to answer the following research questions:

1. What types of assessment methods do Jamaican primary school teachers indicate that they use in their science teaching ?
2. How often do they indicate they use the assessment methods ?
3. Are there any differences in the numbers of teachers who indicate that they utilize named assessment methods based on their gender, school location, age, qualification and teaching experience ?
4. What types of assessment methods do some of the teachers actually use during some observed science lessons ?
5. What problems do the teachers indicate they encounter in assessing their students' science learning ?

Research Design The research design used was a survey involving quantitative (with an *ex post facto* dimension) and qualitative

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components.

Sample The main study sample of 400 teachers (261 rural, 139 urban; 40 males, 360 females) were randomly selected from 54 primary schools in all the 14 counties (parishes) of Jamaica. The pilot sample of 60 teachers were randomly selected from eight primary schools in three of the 14 counties.

Instruments The three instruments used were: a questionnaire, classroom observations and an oral interview.

Teacher Science Assessment Questionnaire (TSAQ) consisted of 18 items requesting the teachers to indicate the assessment methods they often used in teaching science, frequency of use of the methods, and the difficulties they encountered in assessing their students. It was validated by four experts. The test-retest reliability coefficients of the pilot subjects' responses on the TSAQ (with a four-week interval) ranged from .94 to 1.

Classroom Observations One of the authors observed the 150 science lessons (of 30 minutes per lesson) taught by 30 randomly selected subjects who taught grades 2, 4, and 6 students in ten schools using an observation schedule to record the types and frequencies of the assessment methods they actually used. This was done to determine the extent to which the methods they actually used were consistent with the ones they claimed to use often in the questionnaire.

Interview of Selected Teachers The 30 teachers who taught the observed lessons were also interviewed orally using a 14-item structured interview schedule to (a) clarify some of the situations observed in their lessons, (b) determine the degree of the consistencies in their verbal and questionnaire responses. Details of the instrumentation are available from the authors.

Results and Discussion

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TABLE 1 HERE

Table 1 shows the types of assessments the teachers indicated that they utilized in their teaching, starting with the one mostly used: oral quiz, practical work, written tests, project, portfolio and creative drama. Evident in the table is that only few teachers indicated that they used some of the AAM. That most of them did not use some AAM was expected as it epitomizes the typical primary school science classroom which is dominated by the reading of assigned test papers and the answering of questions (Primer, 1988).

TABLE 2 HERE

Table 2 indicates the frequencies of use and the percentages of the subjects who indicated that they used the following assessment methods in decreasing order: (a) oral quiz, written tests and practical work in every lesson, (b) practical work, oral quiz, and written tests in every lesson, and(c) practical work, written tests and projects once per month. The table shows that most of them had not used creative drama and portfolio. The finding that most of the teachers did not claim that they used AAM, such as portfolio and creative drama, is not surprising because during the oral interview, many of them did not know these AAM. It was, however surprising to note that during the oral interview, most of the teachers justified their frequent use of oral quiz as the main assessment method on the large numbers of students' workbooks they had to mark. While Torrance (1995) cited overcrowded classrooms as one of the problems militating against the effective use of AAM, he opines that teachers who teach large classes are the ones who need to use AAM to elicit their students' optimum performance. The finding that many of the teachers claimed that they used written tests once per month is consistent with the findings of Jones (1994).

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TABLES 3 & 4 HERE

To establish if there were any differences in the numbers of subjects who indicated that they employed specific assessment methods based on their five demographic variables, the percentages of respondents who indicated that they used the methods were tabulated. The results, which are shown in Tables 3 and 4 indicate that the percentages of (a) females who claimed that they used all the assessment methods were more than those of males; (b)rural teachers who indicated that they used TAM were more than those of their urban peers; (c) older teachers who indicated that they used more (AAM) were more than those of their younger peers; (d) trained teachers who indicated that they used TAM and AAM were more than those of the untrained teachers; (e) the more experienced teachers (over 20 years) who claimed that they used AAM were more than those of the less experienced colleagues. One of the authors observed that the fact that rural primary school classrooms were more overcrowded than urban schools could have accounted for the use of more TAM by the teachers in the former than in the latter. Furthermore, based on the observations of science lessons, one of the authors confirmed that the older teachers did use more of the AAM than their younger colleagues. The finding that more (a)females indicated that they used more of all the assessment methods than their male peers might be due to the fact that there were more females than males in the sample which was a true reflection of the female/male teacher ratio in Jamaican primary schools; (b) experienced teachers were using more AAM than their less experienced peers could not have been due to differences in their teacher education programs. This is because, to date, alternative assessment has not been introduced into Jamaican teachers' colleges. Hence, it was likely that the more experienced teachers gained their AAM knowledge from workshops which many of them tend to attend more

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than their less experienced colleagues. To establish if there were any statistically significant differences in the numbers of subjects who indicated that they used named assessments methods linked with the five independent variables in Tables 3 and 4, chi-square analyses were computed. The results suggest that there were statistically significant differences in the numbers of teachers who indicated that they used (a) written tests in favor of those aged over 30 years ($p < .01$) and the less experienced teachers ($p < .01$); (b) practical work ($p < .05$), oral quiz ($p < .05$) and projects ($p < .01$) in favor of those aged over 30 years; and (c) portfolio in favor of those aged over 30 years ($p < .01$) and the urban teachers ($p < .01$). These findings confirm the data in Tables 3 and 4 discussed earlier.

TABLE 5 HERE

Table 5 indicates that, during the 150 science lessons observed by one of the authors, oral quiz was the commonest method often used by the 30 teachers, while they used practical work, written tests, creative drama and portfolio [illegible] 21%, 5%, 3% and 1%, of the time, respectively. This finding seems to be consistent with the responses of the majority of the 400 subjects shown in Tables 1 and 2 indicating that AAM were rarely used by them.

To identify the problems that the subjects encountered in assessing their students' science learning, they were asked to rank ten statements from the most serious to the least serious. The first three most serious problems they ranked were: their lack of adequate knowledge of how to assess their students' learning, high student: teacher ratio, and lack of facilities to keep students' test results, while the two problems they ranked as the least serious were: " many students hated taking tests often", and "the marking of my students' scripts is time-consuming".

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The following were the main findings from the oral interview held with the 30 teachers whose science lessons were observed. Twenty seven of them described their classrooms as overcrowded; 29, 21,2, and 1 of them said that they used oral questions, written tests, projects and portfolio respectively to assess their students; 26, and 3 of them said that they assessed their students at the end and during the lessons respectively; 23 and 6 of them said that oral quiz and written tests respectively were the most effective ways of assessing their students, while "too many students per class" and "my lack of knowledge of how to assess my students", " many students are unable to read", and " no time for assessment" were considered by 26,24,9, and 7 of them, respectively, as the main problems they encountered in assessing their students. The oral interview indirectly confirmed that oral quiz and written tests were the two assessment modes that most of the 400 teachers claimed that they used. In short, the consistencies in the subjects' responses on the questionnaire and oral interview were fairly high.

Conclusions and Educational Implications

This study is significant because (a) it is, perhaps, the first to be done in Jamaica; (b) it reveals that oral quiz was the assessment method that (i) most of the 400 subjects indicated that they often used during science lessons, and (ii) all the 30 subjects observed during the 150 science lessons often used, while practical work was sparingly used by the teachers observed. Again, the study revealed that most of the subjects admitted that they lacked the knowledge of using even the TAM effectively. This, in part, explained why most of the subjects did not indicate that they used the three AAM (project, portfolio, and creative drama) listed in their questionnaire. In sum, this study suggests that most of the subjects

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did not assess their students' science learning properly. Because assessment is posited to guide instruction and vice versa (Foster & Hesting, 1994), this study's findings suggest that many Jamaican primary school students are not likely to be taught science properly by their teachers. This was confirmed by Bailey, Brown and Lofgren's (1996) findings. A basic, crucial reason why most of this study's subjects admitted that they lacked the knowledge of the various assessment methods they needed to assess their students' science learning was that their teacher education program either lacked this component or did not adequately equip them with the knowledge. This is consistent with Stiggins et al., (1992) assertion stated earlier. Indeed, our experience of the Jamaican primary science teacher education program is that prospective teachers are not taught the various assessment methods they need to assess their students' learning. Bailey, Brown and Lofgren's (1996) findings confirm this fact. This implies that the teaching of traditional and alternative assessment strategies should be incorporated into the (a) Jamaican preservice primary school teacher education program; and (b) workshops for inservice primary school teachers organized by the Jamaican Ministry of Education, Jamaican Teachers' Association and Association of Science Teachers of Jamaica on a regular basis. Unless appropriate steps like these are taken to remedy the situation, the poor science knowledge and performance of most Jamaican primary school students reported by Bailey, Brown and Lofgren (1996), are not likely to improve. This is partly because recent research evidence suggests that many Jamaican primary school science teachers have a poor science knowledge (Bailey, Brown & Lofgren, 1996; Soyibo & Thorpe, 1999) and the literature also shows that teachers' assessment methods affects their students' learning and school attainment (e.g. Wiggins, 1993).

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Table 1 Assessment Methods Primary Teachers Use in Science Teaching

Method	No. of teachers using method	%
Oral quiz	300	75
Practical work	267	67
Written tests	242	61
Project	132	33
Portfolio	42	11
Creative drama	20	5

N = 400 in each case

Table 2 Teachers' Percentage Frequencies of Use of Assessment Methods

Method	In every lesson	Once per week	Once per month	Not at all
Oral quiz	62	19	8	12
Written tests	10	13	42	36
Practical work	7	20	48	26
Projects	5	8	26	61
Portfolio	1	4	6	89
Creative drama	0	0	5	95

N = 400 in each case

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Table 3 Primary Teachers' Use of Assessment Methods by Location, Age, and Gender in Percentages

Method	Location		Age			Gender	
	Urban	Rural	Under 20	20-30	Over 30	Male	Female
Oral quiz	29	46	5	20	49	7	67
Written tests	29	42	4	20	47	7	64
Practical work	26	48	5	19	50	7	67
Project	18	22	2	10	28	5	35
Portfolio	6	4	0	3	7	1	10
Creative drama	3	2	0	2	4	1	5

N = 400 in each case

Table 4 Primary Teachers' Use of Assessment Methods by Qualification and Teaching Experience in Percentages

Method	Qualification		Teaching Experience	
	Trained	Untrained	< 20 years	> 20 years
Oral quiz	69	5	40	33
Written tests	66	5	36	34
Practical work	69	5	38	36
Project	38	1	17	22
Portfolio	10	1	3	7
Creative drama	5	1	2	4

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Table 5 Percentage Frequencies of Assessment Methods Used During Observed Lessons

Stage of lesson	Method used	%
At the beginning	Oral quiz	39
	Practical work	10
	Written test	1
Towards the middle	Oral quiz	32
	Practical work	15
	Written test	1
	Portfolio	1
Towards the end	Oral quiz	35
	Practical work	7
	Written tests	5
	Creative drama	2
	Creative writing	2
	Portfolio	1

N = 150 in each case

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